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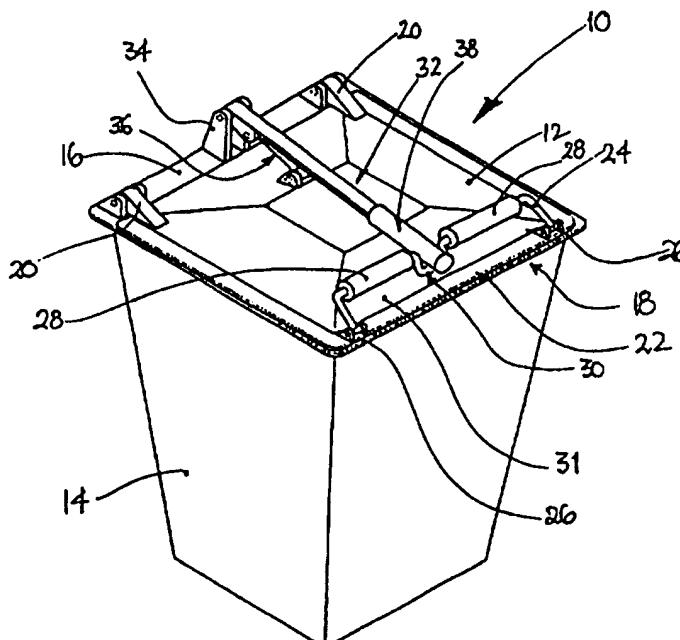
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(21) International Application Number: <b>PCT/AU96/00282</b> (22) International Filing Date: 9 May 1996 (09.05.96)  (71)(72) Applicants and Inventors: PIERCE, Guy [AU/AU]; 109 Talinga Drive, Park Ridge, QLD 4125 (AU). MITCHELL, Roger [AU/AU]; 109 Talinga Drive, Park Ridge, QLD 4125 (AU).  (74) Agent: GRIFFITH HACK & CO.; G.P.O. Box 3125, Brisbane, QLD 4001 (AU).	(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	Published <i>With international search report.</i>

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(54) Title: A BIN COMPACTOR

(57) Abstract

A lid (10) for a bin (14), the lid (10) having actuating means in the form of pivotable handles (24) that act on the lid (10) to compress any contents in the bin (14). A locking handle (32) is also provided to lock the pivotable handles (24) in position. Ribs are also provided on the underside of the lid (10) to compress any contents in the bin nearing the top level of the bin.



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### A BIN COMPACTOR

#### FIELD OF THE INVENTION

The present invention relates to a lid for a bin having means associated therewith for compressing 5 contents of the bin (eg. rubbish, waste paper, recyclable material etc). The invention can be used with any type of bin, and finds particular application with so called "wheely-type" bins. The invention will be in part described with reference to this latter application but 10 is not so limited.

#### BACKGROUND ART

All bins have a limited holding capacity. As the restriction on the amount and type of contents held in bins has changed, users must find better and more 15 efficient ways of utilising bins. Existing bins when full may not provide the user with the storage or capacity they require. To this extent, users attempt to force more contents into the bin using unsatisfactory techniques such as hand- or foot-pressing contents 20 downwardly.

#### SUMMARY OF THE INVENTION

In a first aspect, the present invention provides a lid for a bin, the lid having actuating means associated therewith that is actuatable on the lid to enable it to 25 compress any contents of the bin adjacent thereto.

In this manner, the actuating means can be engaged by the user to assist the user in compressing bin contents so that the user does not have to resort to the use of their feet and/or hands to directly compress the 30 contents of the bin.

When the term "bin" is used herein it includes all types of bins of varying sizes including "wheely-type" bins, garbage and trash cans, kitchen tidies, skips, industrial bins, dump-truck bins etc.

35 Preferably the actuating means is one or more pivotable handles that are arranged on the upper side of the lid and that can be moved theretowards to assist in said compression. The actuating means can be a lever

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that is adapted for pivotal mounting to both the bin and the lid such that when moved in a first direction (eg. towards the lid) the lever causes the lid to be urged towards complete closure to effect said compression of  
5 contents.

In a second aspect the invention provides a lid for a bin that has one or more projections arranged on the underside of the lid in fixed relation thereto, the or each projection being positioned such that contents of  
10 the bin can be compressed during lid closure.

By employing projections that have a fixed relation to the underside of the lid, the simple act of lid closure facilitates the engagement of the projections with contents of the bin adjacent thereto to effect  
15 compression without any further intervention from the user.

Preferably the or each projection is a rib integral with the lid that projects generally downwardly into the bin when the lid is closed. A series of ribs can be  
20 arranged in a number of different ways (as described below).

Alternatively, or in addition to the ribs, the or each projection can include a plate arranged under the lid underside that is moveable with the lid during  
25 closure to cause said compression of contents. The plate can be adapted for hinge-mounting to the bin and movement of the plate with the lid can be achieved via a connecting rod being pivotally mounted at opposing ends to the lid underside and plate upperside respectively.

30 The first and second aspects are complementary in that a lid can be provided that includes both the first and second aspects of the invention.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Notwithstanding any other forms which may fall  
35 within the scope of the present invention, preferred forms of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

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Figure 1 shows a perspective view of a preferred lid according to the invention;

Figure 2 shows a perspective view of the lid of Figure 1 when fitted to a bin and when closed;

5 Figures 3 to 6 show a series of side elevations of a preferred lid according to the invention when fitted to a bin in progressive modes of lid closure and bin contents compression;

10 Figures 7 to 10 show similar views to Figures 3 to 6, however for a progressive lid opening sequence;

Figures 11 to 13 show side elevations of a progressive bin-lid closure employing a preferred lever mechanism according to the invention;

15 Figure 14 shows a detail of the bin and lid of Figures 2 to 13;

Figure 15 shows a more detailed side elevation of a closed bin-lid arrangement with compressed contents therein;

20 Figure 16 shows a detail of the preferred lever mechanism according to the invention;

Figures 17 to 20 show different bin configurations for use with a preferred lid according to the invention;

25 Figure 21 shows a perspective view of a further preferred lid according to the invention when fitted to a bin;

Figures 22 to 24 show side sectional views of the bin-lid arrangement of Figure 21 in sequential stages of bin contents compression; and

30 Figure 25 shows a detail of the lid mechanism of the lid of Figure 21.

#### MODES FOR CARRYING OUT THE INVENTION

Referring to Figures 1 and 2, a lid 10 has a lid section 12 which can be either directly mounted (especially hinge-mounted) to a bin 14, or can be 35 indirectly mounted to the bin via a peripheral rim 16. Rim 16 in turn has downwardly projecting peripheral skirt 17 for fitting inside the periphery of the bin opening 18. The lid section 12 is also preferably hingedly

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mounted to the rim 16 via a pair of opposing hinges 20.

A front edge 22 of the lid section can have an elongate and pivotable handle member 24 pivotally mounted thereto via hinges 26. The handle member has a pair of 5 grips 28 for handling by a user (see Figures 3 to 10) and can be pivoted forwardly (ie. towards the lid section 12) by a user. During such pivoting, U-section 30 engages against face 31 of the lid section and thus a user can force the lid towards a closed position; (this action is 10 better shown in Figures 3 to 6).

The lid can also be provided with a lever handle 32 which is hingedly mounted either to the bin and the lid or to the peripheral rim and to the lid (although the Figures show a preferred arrangement in which the lever 15 handle is mounted to the rim rather than directly to the bin). The lever handle is pivotally mounted to upstanding bracket 34 and is pivotally connected to the lid section via a link 36 (described in more detail below). In addition, the lever handle is provided with a 20 grip 38 at its free end to facilitate user handling. The lever handle can be formed and shaped such that the grip deformably locks within the U-shaped section 30 when the lid is closed to assist in locking closure of the bin.

The lever handle is mounted to the lid so that as 25 the user urges the handle downwardly towards the lid, the link acts on the lid section and forces it towards a completely closed position. This results in an enhanced bin contents compression (and is described below in greater detail with reference to Figures 11 to 16).

30 The underside of the lid section is provided with a matrix of projecting webs 40, which criss-cross within prearranged sections on the underside of the lid (see also the configurations in Figures 17 through to 20 where these prearranged sections also align with corresponding 35 bin dividers). In side elevation, the ribs generally taper downwardly towards an inverted apex 42 and this arrangement facilitates maximum compression of bin contents towards the centre of the bin. An alternative

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configuration of a projection arrangement under the lid is shown and described in Figures 21 through to 25 below.

Referring to Figures 3 through to 6, one mode of compressing the contents of bin 14 using a preferred lid according to the invention will now be described. Such compression finds application with bin contents such as rubbish, waste paper, recyclable containers and packages, compost, biodegradable matter and other articles to be stored and/or disposed of. In Figure 3, the bin contents have reached the level indicated by dotted line 44 through filling by a user. An extra container C to be added to the bin and compressed with the remaining contents is then placed on top of this level. A user would have previously opened the lid to enable this container C to be placed in the bin (eg. by pulling upwardly the handle member 24). The user then commences to urge the lid downwardly by pressing downwardly and forwardly on the handle member 24 (either with one or two hands gripping respective grips 28).

As in Figure 5, the projecting webs engage the container C and cause it to be crushed (ie. progressively deformed), ultimately compressing it into the configuration as shown in Figure 6. In this orientation, the container C has been forced below the level 44 so that it forms part of the contents of the bin.

In addition, (and as described below) the orientation of the lever handle 32 is such that it can be used to lock the lid in the closed position.

The lid can be re-opened for adding further contents to the bin or for emptying the same simply by reversing the above procedure as shown in Figures 7 through to 10. In a preferred mode, the unlocking of the lid is effected firstly by lifting lever handle 32 pivotally away from the lid (as described below).

Referring to Figures 11, 12 and 13, the compression of a relatively harder member H (ie. that is difficult to compress) using the handle member 24 is now described. Specifically, and once again, the lid is lowered to the

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position shown in Figure 11 by a user gripping one or more of the grips 28 of handle member 24. Because it is relatively difficult for the user to cause compression of the hard container H, the user resorts to the use of 5 lever handle 32. The compression force using the lever handle is increased dramatically over the handle member 24 because of the mechanical advantage achieved through the greater sweep of lever handle travel for the same degree of compression (this is further explained 10 referring to Figure 14). The user grips the lever handle 38 (see Figure 12) and urges it downwardly towards the lid as shown. This action causes crushing of the hard container until the grip reaches the position shown in Figure 13. With such action, the grip 38 is caused to 15 move into the U-section 30 of the handle member 24 thereby closing the lid and also locking the lid closed (as described below). Once again, the hard container is sufficiently crushed or compressed so as to be below the level 44.

20 Referring to Figure 14, the travel of lever handle 32 relative to handle member 24 (respectively designated by distances x and y) to achieve the same degree of lid movement is shown. By employment of the lever handle 32 a lever ratio of approximately 4:1 over the handle member 25 24 can be achieved.

Figure 15 shows in greater detail the contents of the bin when compacted and when the lid is in the closed position. It can be seen how the inverted apex 30 configuration of the projecting web 40 causes a greater degree of compression in the centre of the bin (ie. along central plane A).

Referring to Figure 16, the lever handle mounting mechanism will now be described in greater detail. The lever handle is pivotally mounted to the upstanding 35 bracket 34 via a pivot pin arrangement 46. The mounted end of the lever handle has a plate shroud 48 arranged therearound and one end of link 36 is pivotally mounted to the plate via a cross-pin 50. The other end of the

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link is pivotally mounted to the lid-section 12 via hinge 52. As the lever handle is urged downwardly towards the lid-section 12 (causing the lid to close), the underside of the lid experiences upwardly directed force F from the 5 contents of the bin (ie. a reactive force against compression). This force is transferred through the link 36 in the direction as indicated, and is concentrated along central axis CA of the link. The direction of the force is thus passed via the plate shroud and outwardly 10 in the direction indicated by arrow D.

Because the central component of this force is generally directed below pivot pin 46, and because the upstanding bracket is a rigid, generally non-deformable bracket, a momentary-type reaction force M around the 15 pivot pin 46 is set up and this in turn causes lever handle to be urged towards the lid-section. Thus, the lever handle is locked towards the lid-section as it is brought towards lid-section 12. This locking, in combination with the locking of the grip 38 within the U- 20 section 30 gives an enhanced locking of the lid against the compressive forces of the bin contents when the lid is in the closed position.

As the rubbish dries out with time, it loses its elasticity and hence little or no pressure is then placed 25 on the locking arrangement. Thus, new amounts of contents can be added to the bin for further compression.

Figures 17 through to 20 show four different bin internal arrangements. As described above, the cross-projecting webs 40 can be divided on the underside of the 30 lid as appropriate. In Figures 17 through to 24, four different quadrants Q are arranged on the underside of the lid. Figure 17 shows a bin with no dividers; Figure 18 shows a bin with a single divider 54 which divides the bin in half; Figure 19 shows an additional divider 56 to 35 the single divider which divides the bin in three; and Figure 20 shows a further divider 58 that is used with the other dividers to divide the bin into four equal volume sections. In the arrangement of Figure 20, each

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quadrant compresses a respective divided bin section; in the arrangement of Figure 19, the two lefthand quadrants compress the larger lefthand bin-section and the two righthand quadrants each compress a respective bin-  
5 section; in the arrangement of Figure 18 the left and righthand quadrants each compress a respective half-bin-section; and in the arrangement of Figure 17 the four quadrants combine to compress the entire contents of the bin.

10 Referring to Figures 21 through to 25, an alternative projecting mechanism will now be described. The projecting mechanism includes a plate 61 which is hingedly mounted along its back edge 62 to the inside of the bin 14. A connecting rod 63 is pivotally mounted to  
15 the plate at hinge 64 and extends therefrom and is mounted to a bracket 70 at its opposing ends via pivot pin 65. Bracket 70 is mounted to (eg. welded, pop-riveted etc) an arm 66, which in turn is attached to the underside 67 of the lid via a mounting plate 68. The arm  
20 is also pivotally mounted at an opposing end to the bin via elongate hinge 69. The bin can include a divider 72 and rubbish R can be stored either in the front or back-sections of the bin as shown. In addition, the bin can be a wheely-type bin having wheels 74 rotatably mounted  
25 thereto for ease of bin movement.

Referring to Figures 22 to 24, operation of the projecting arrangement will now be described. Rubbish R is loaded into the back divided section B of the bin with the lid in the open position (Figure 22). The lid is  
30 then pivoted forwardly around hinge 69, and this causes the plate 61 to impinge upon and begin to compress the rubbish R (ie. as shown in Figure 23). As the plate is moved towards the closed position, the rubbish is further compressed and is forced into the remaining rubbish in  
35 the bin until the closed position of the lid is reached (ie. as shown in Figure 24). Once again, the rubbish will dry out and lose its elasticity (eg. approximately one hour after compression) and further rubbish can be

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loaded into and compressed within the bin at a later stage.

The plate arrangement thus provides an additional rubbish (or contents) cover, and this can assist in stopping bin overflow, and can reduce flies, maggots etc.

Referring to Figure 25, the mounting of the lid and plate arrangement is shown in greater detail, and similar force vectors are generated as shown in Figure 16. As can be seen, the contents of the bin exert an upwardly directed reactive force  $F$  which is then transferred through the connecting rod 63 and pivot pin 65. A continuation of this force in direction D is shown, and the central component of this force vector is below elongate hinge 69. As a result, a moment  $M$  is generated and this closes the bin lid. Thus, the greater the reactive force from the bin contents, the greater the ultimate locking force applied (ie. by virtue of moment  $M$ ) to the lid.

Once again, the plate projecting arrangement of Figures 21 to 25 can be employed with either or both of handle member 24 and lever handle 32.

The lid mechanisms described above find particular application with wheely-type bins or bins of a similar size, although the mechanisms can be used with kitchen-tidies and domestic bins as well as industrial waste disposal bins etc.

Typically, many of the components are formed from plastics material, including the lid, bin and various components, although the components subjected to strenuous reactive forces are preferably formed from a metal material (eg. stainless steel, aluminium etc). These components would include connecting rods, plates, links, hinges, handles, pivot pins etc.

Whilst the invention has been described with reference to a number of preferred embodiments, it should be appreciated that the invention can be embodied in many other forms.

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CLAIMS

1. A lid for a bin, the lid having actuating means associated therewith that is actuatable on the lid to enable it to compress any contents of the bin adjacent thereto.

2. A lid as claimed in claim 1 wherein the actuating means is one or more pivotable handles arranged on the upper side of the lid and adapted so that when pivoted, the or each handle can assist the lid in compressing any bin contents adjacent to the underside of the lid during closure.

3. A lid as claimed in claim 1 or claim 2 wherein a rear edge of the lid is adapted for hinge mounting directly or indirectly to the bin, with at least one handle being arranged adjacent to a front and opposing edge of the lid on the upper side and pivotally attached at opposing ends thereof to the lid.

4. A lid as claimed in claim 3 that is indirectly mounted to the bin via a rim that surrounds the lid, the rim being adapted for mounting to the bin at an opening thereof and the lid in turn being hinge-mounted to the rim.

5. A lid as claimed in claim 3 or claim 4 wherein said at least one handle includes two handle sections, each adapted for gripping engagement by a user's hand so that, when the sections are pivoted towards the lid with the lid pushed downwards, said assisted compression of bin contents can be effected.

6. A lid as claimed in any one of claims 2 to 5 wherein at least one of the pivotable handles is a lever adapted for pivotal mounting to both the bin and the lid so that when the lever is moved in a first direction it causes

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the lid to be urged towards closure to effect said compression of contents.

7. A lid as claimed in claim 6 wherein the lever is indirectly mounted to the bin via a rim or is directly 5 mounted thereto.

8. A lid as claimed in claim 7 wherein one end of the lever is pivotally connected to the rim or the bin either directly or via a pivot region on an upstanding support, and is connected to the lid via a link arm.

10 9. A lid as claimed in claim 8 wherein the link arm is pivotally mounted to each of the lid and lever although it is connected to the lever via a flange arranged at or near said one end of the lever.

15 10. A lid as claimed in claim 8 or claim 9 wherein the mounting of the link arm to the lever is such that an imaginary extension of a central axis through the link is offset below the pivot region.

20 11. A lid as claimed in any one of claims 8 to 10 wherein the link arm is mounted to the lid at a position approximately in the middle of that half of the lid adjacent to the lid rear edge.

25 12. A lid for a bin that has one or more projections arranged on the underside of the lid in fixed relation thereto, the or each projection being positioned such that contents of the bin can be compressed during lid closure.

13. A lid as claimed in claim 12 wherein the or each projection is a rib integral with the lid and projecting generally downwards into the bin when the lid is closed.

30 14. A lid as claimed in claim 13 wherein a plurality of

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ribs are provided and are arranged on the underside of the bin in a criss-cross matrix.

15. A lid as claimed in claim 14 wherein distinct rib regions are arranged on the underside, each region being 5 defined by a peripheral rib therearound and corresponding to a respective region in the bin.

16. A lid as claimed in claim 15 wherein the respective regions in the bin are defined by upright bin dividers which divide the bin into generally vertically extending 10 compartments.

17. A lid as claimed in any one of claims 12 to 16 wherein the or each projection includes a plate arranged under the lid underside and moveable with lid closure to cause said compression of contents.

15 18. A lid as claimed in claim 17 wherein the plate is adapted for hinge-mounting to the bin and movement of the plate with the lid is achieved via a connecting rod being pivotally mounted at opposing ends to the lid underside and the plate upperside respectively.

20 19. A lid as claimed in claim 18 wherein the plate is adapted for hinge-mounting just inside the bin and/or adjacent to or at the bin opening.

25 20. A lid as claimed in any one of claims 12 to 19 that is adapted for hinge-mounting either directly to an edge of the bin at an opening thereof, or indirectly to the bin via a rim surrounding the lid, the rim being mountable at the bin opening.

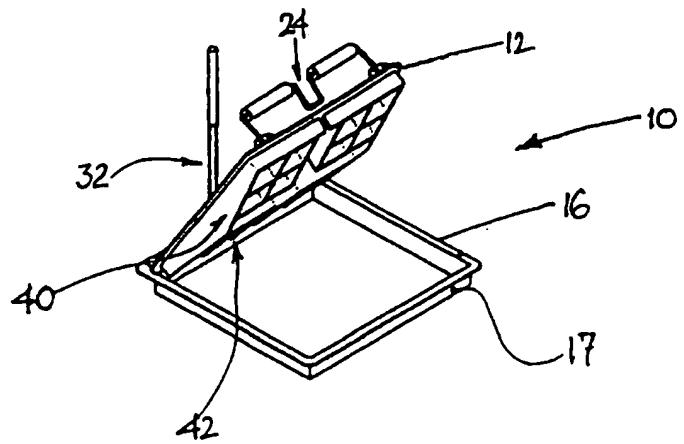
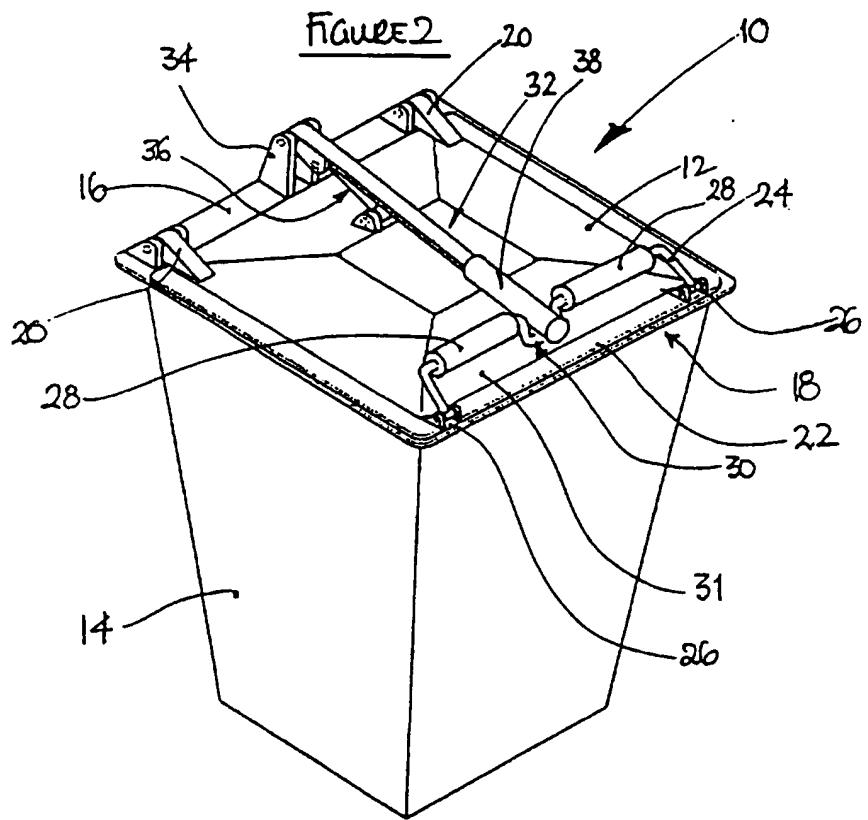
30 21. A lid as claimed in any one of the preceding claims that is attached either directly or indirectly to the bin via one or more hinges, the or each hinge incorporating a spring mechanism that is adapted for enabling the lid to

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be positioned at various locations at and between a closed position and a fully open position of the lid.

22. A lid substantially as herein described with reference to the accompanying drawings.

5 23. Any bin fitted with a lid as defined in any one of the preceding claims.

FIGURE 1FIGURE 2

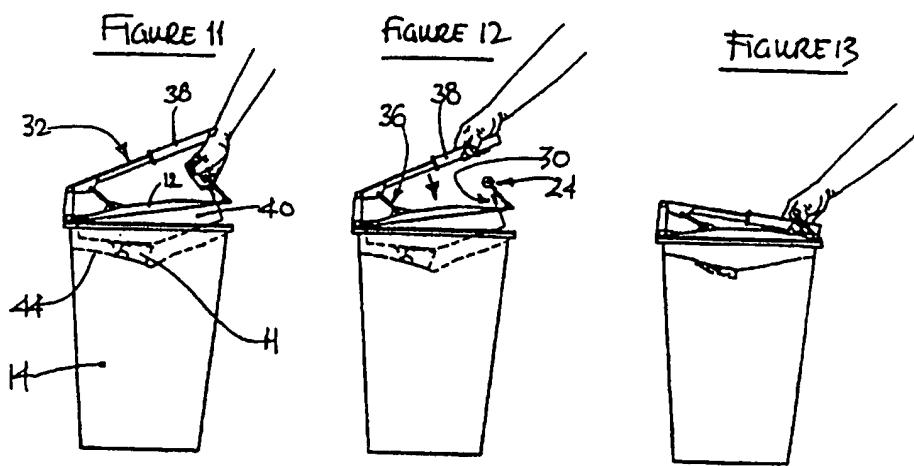
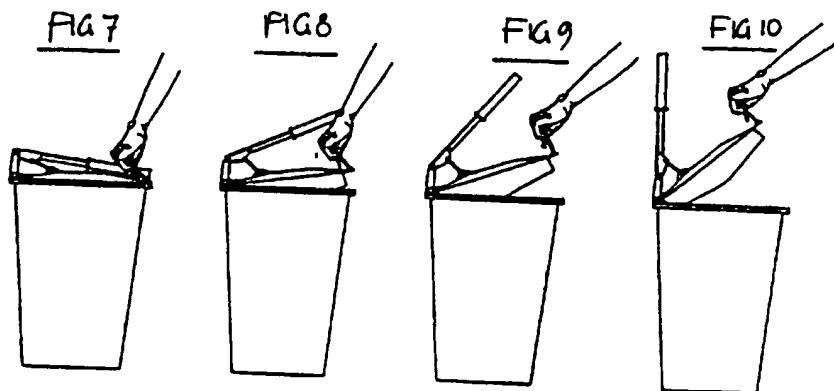
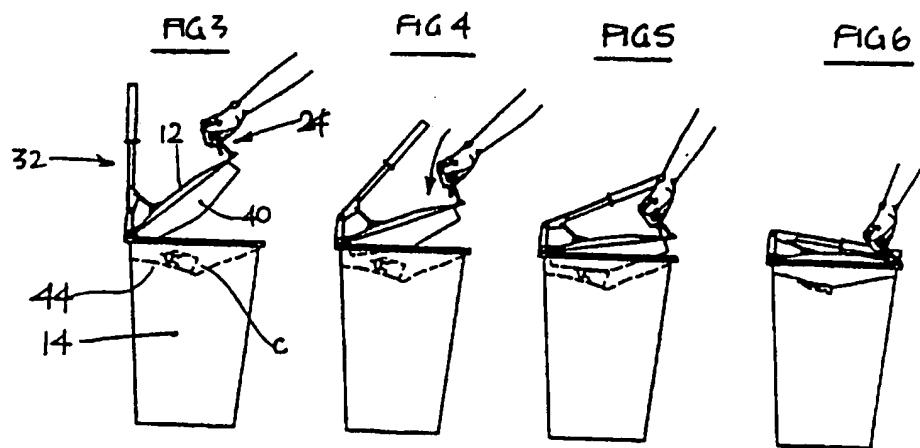
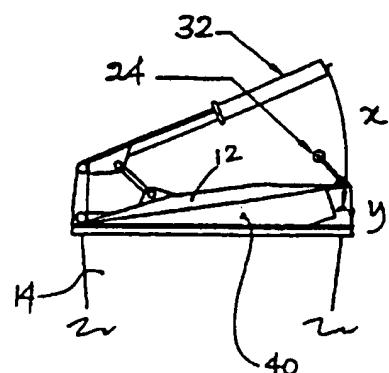
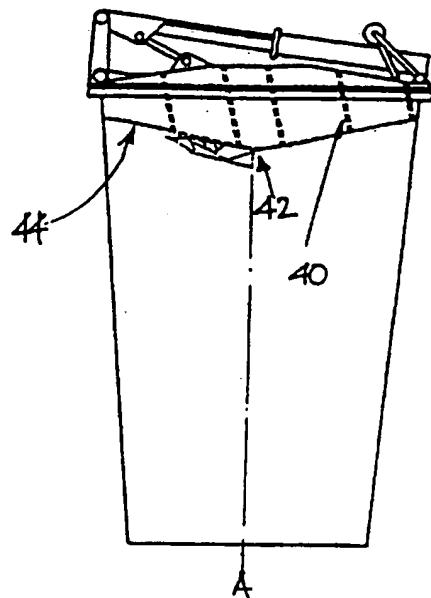


FIGURE 14



## Figure 15



### FIGURE 16

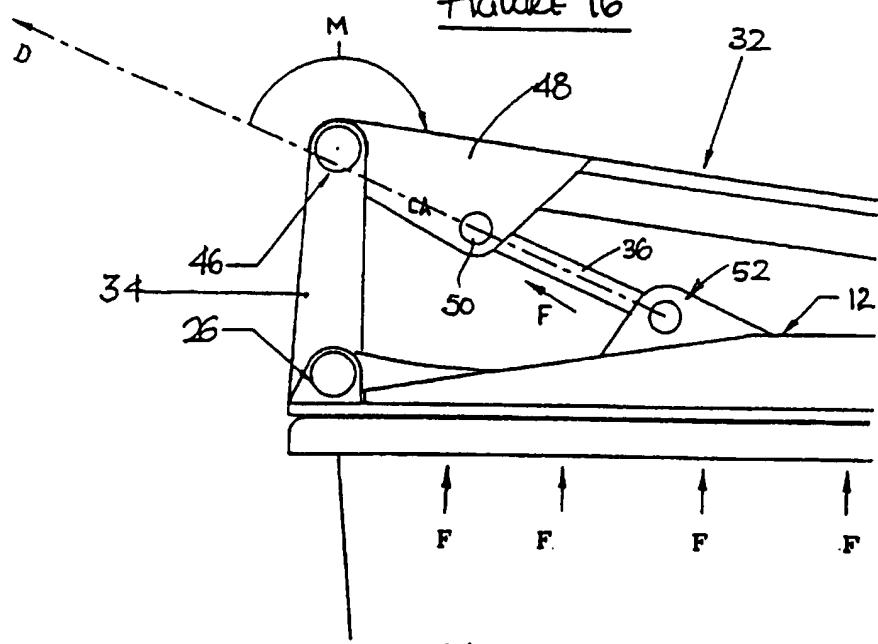
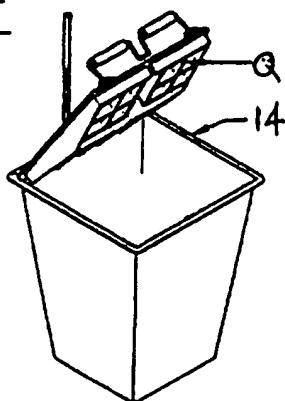
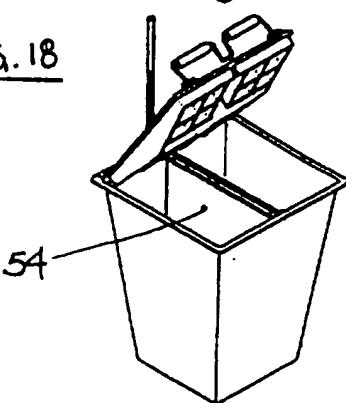
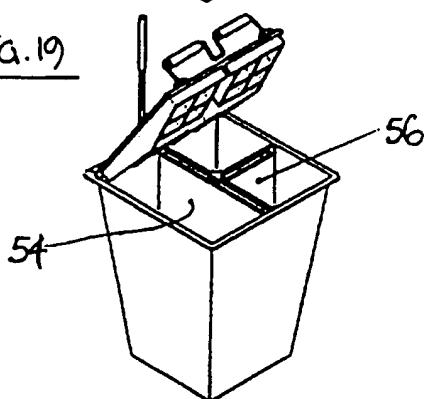
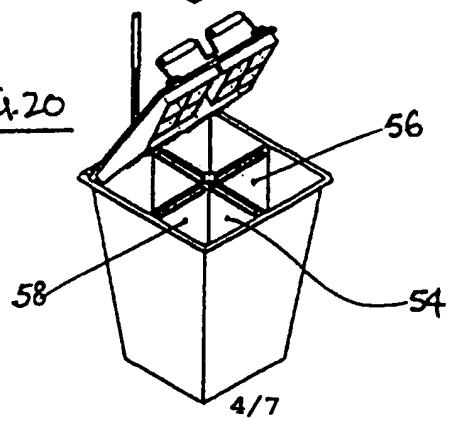


FIG. 17FIG. 18FIG. 19FIG. 20

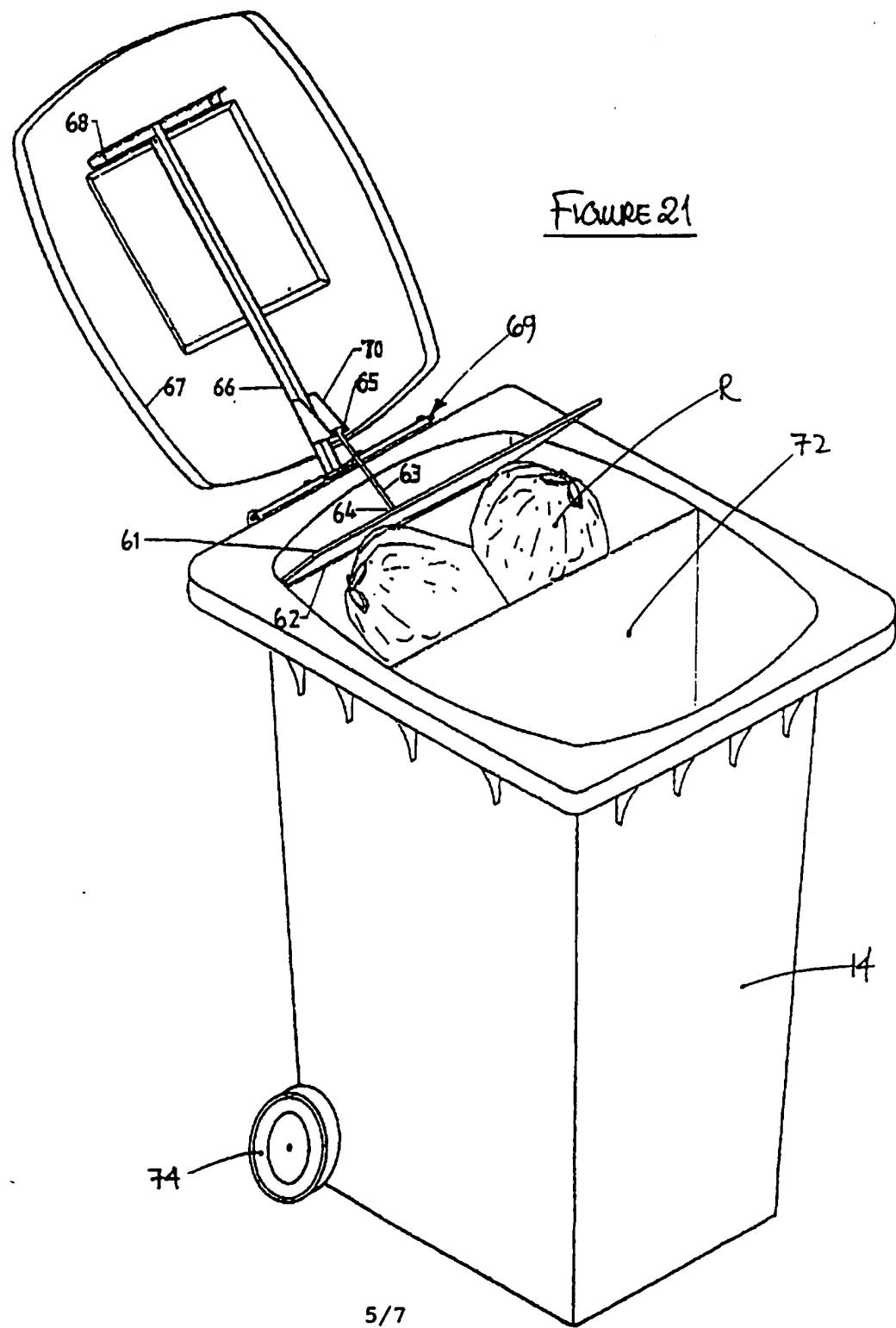


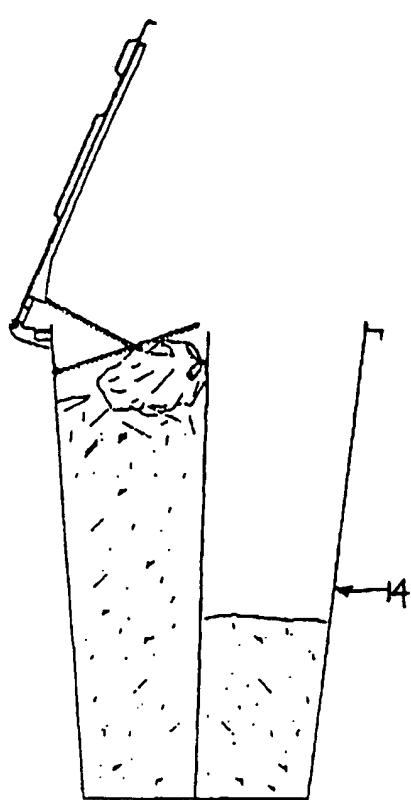
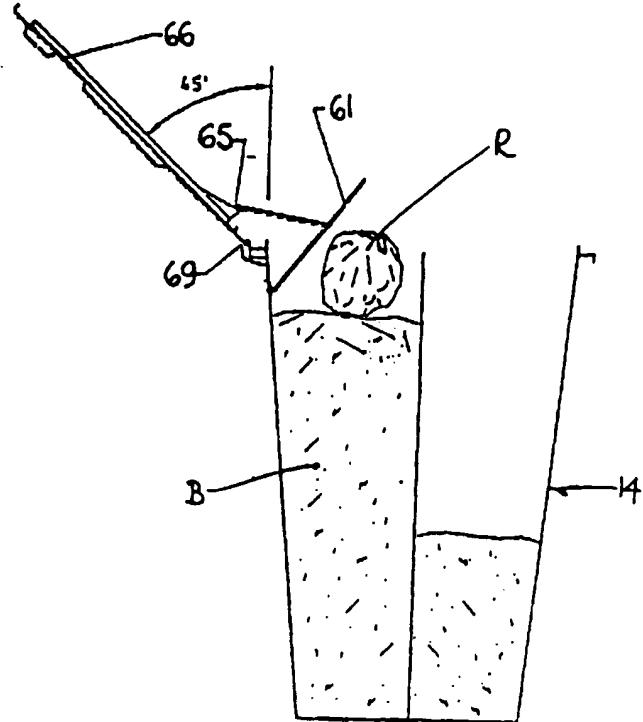
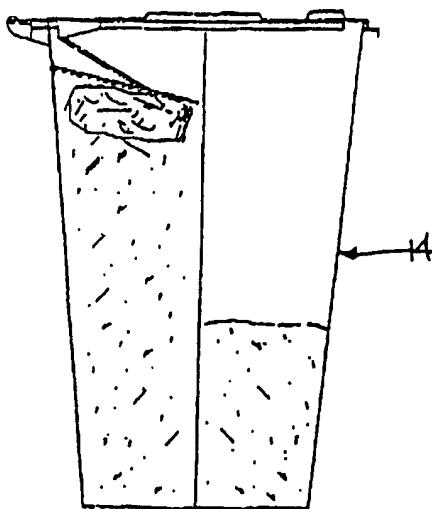
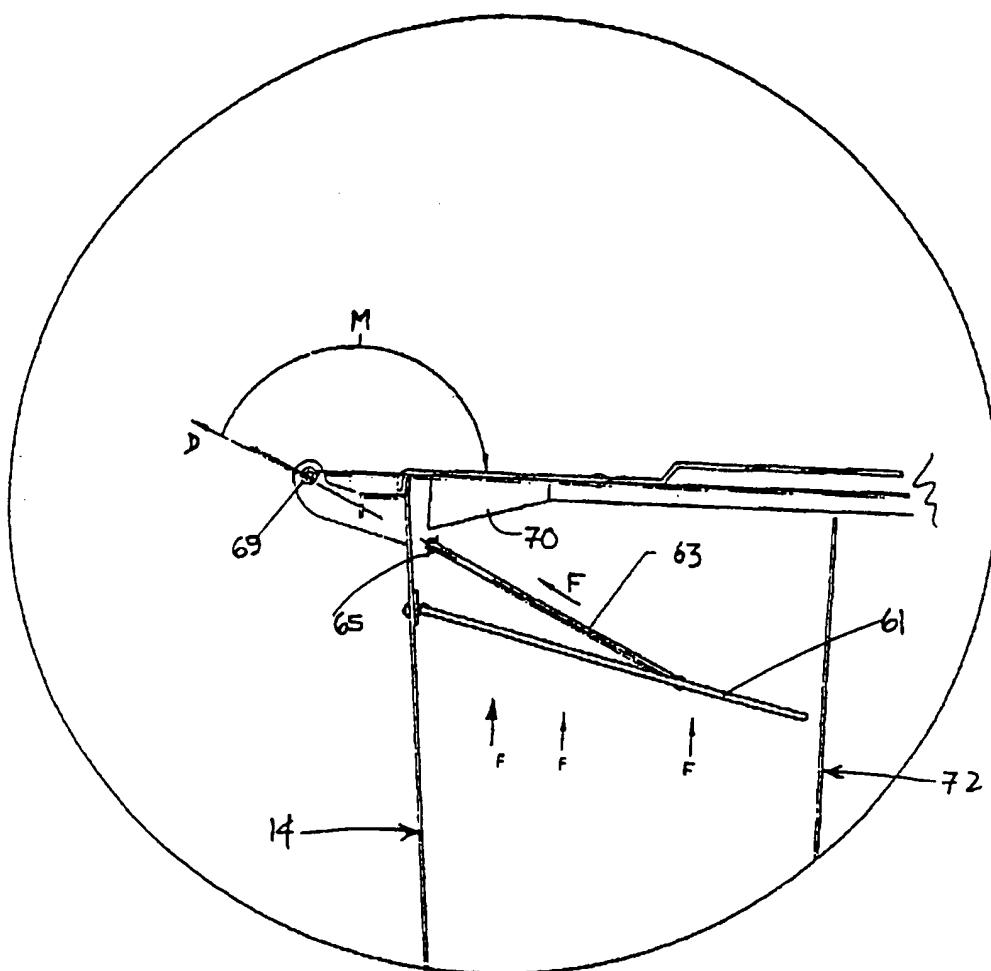
FIGURE 23FIGURE 22FIGURE 24

FIGURE 25



# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/AU 96/00282

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int Cl <sup>6</sup> : B65F 1/14, 1/16, 1/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC B65F 1/14, 1/16, 1/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU : IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT, JAPIO		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4286515 A (BAUMANN ET AL.) 1 September 1981 see abstract, figs 1-4	1-3, 6, 12
X	EP 438978 A (RODOLICO) 31 July 1991 see abstract	1, 2, 6, 7
X	WO 9304956 A (PLASTIC OMNIUM AG) 18 March 1993 see abstract	1-3, 12
X	US 4164178 A (BAUMANN ET AL.) 14 August 1979 see abstract & figures 12a, 12b	1, 12
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**INTERNATIONAL SEARCH REPORT**International Application No.  
PCT/AU 96/00282

<b>C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
<b>Category*</b>	<b>Citation of document, with indication, where appropriate, of the relevant passages</b>	<b>Relevant to claim No.</b>
X	US 4416197 A (KEHL) 22 November 1983 see abstract	1, 12
X	AU 19577/92 A (LLOYD et al) 14 January 1993 see abstract and fig. 1	1-2
X	US 4152979 A (SCHMIDT) 8 May 1979 see abstract	1

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International Application No.  
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Patent Document Cited in Search Report				Patent Family Member			
US	4286515	AT	485	AT	2127	DE	2850959
		EP	6242	EP	29823	EP	29822
EP	438978	CA	2034767				
WO	9304956	AU	24640/92				
US	4164178	AT	2741/78	BE	866074	CH	616898
		DE	2814791	DK	1569/78	ES	468901
		FI	781182	FR	2387864	GB	1593808
		IT	1104118	JP	53130875	LU	79465
		NL	7804176	NO	781351	SE	7804404
US	4416197	CA	1217676				
AU	19577/92						
US	4152979	CA	1087136				
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